Center Innovation Fund: JPL CIF

MoSi SNSPDs with reduced cryogenic requirements

Completed Technology Project (2015 - 2016)

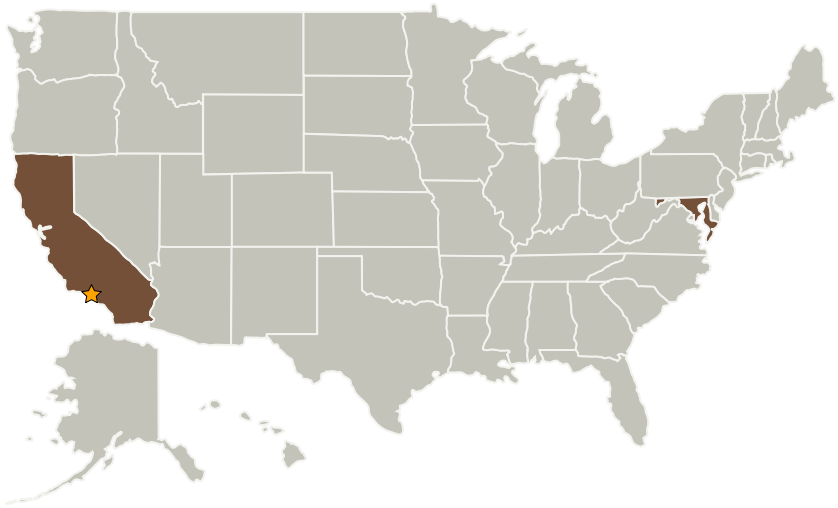
Project Introduction

WSi SNSPDs are the highest-performing single photon detectors available in the infrared, but have a 1K operating temperature. Such detectors are currently baselined for future optical communication ground terminals. MoSi is another amorphous superconductor, but with a 7K bulk operating temperature. In preliminary experiments conducted at NIST Boulder & U. Geneva, MoSi SNSPDs have demonstrated comparable detection efficiency, timing jitter, and device yield to WSi SNSPDs, but at higher operating temperature. Objectives: Design, fabricate and test MoSi SNSPD arrays for time-correlated single photon counting at 3K operating temperatures; Fabricate devices in MDL; Test devices in SNSPD test lab

Anticipated Benefits

DSOC ground terminal is currently baselining a complex superconducting detector instrument with a 1K cryostat at the Palomar Observatory. CIF-funded MoSi technology development could feed directly into DSOC project, reducing cost, risk, and complexity. Can also benefit other SNSPD applications, such as quantum communication, quantum computing, and optical ranging. If used as a "drop-in" replacement for WSi, MoSi can make JPL more competitive for single photon detector development projects from NASA, DARPA, private industry and OGAs.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Maryland

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:

Michael R Lapointe

Program Manager:

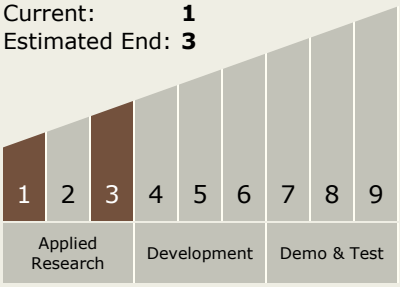
Fred Y Hadaegh

Principal Investigator:

Matthew D Shaw

Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **3**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.5 Revolutionary Communications Technologies
    - TX05.5.2 Quantum Communications